The invention claimed is:

1. A method for separating the complementary single-stranded polynucleotide products of an amplification reaction from one another comprising:

a) amplifying a target polynucleotide by means of two oligonucleotide primers, wherein one primer is capable of hybridizing to the target polynucleotide and the other primer is capable of hybridizing to the complement of the target polynucleotide, and wherein one of the primers comprises a chemical tag, thereby producing an amplification product mixture comprising a tagged amplification product of the target polynucleotide and a complementary non-tagged amplification product;

b) applying the amplification product mixture to a separation medium , wherein the chemical tag is capable of interacting with the separation medium; and

c) eluting the amplification products from the separation medium by means of a mobile phase under denaturing conditions, wherein the interaction between the tag and the separation medium results in the physical separation of the tagged amplification product from the non-tagged amplification product.

2. The method of Claim 1, wherein at least one of the amplification products is detected.

3. The method of Claim 1, wherein at least one of the amplification products is collected.

4. The method of Claim 1, wherein the amplification product mixture is applied in the presence of a first counterion agent, wherein the separation medium has a non-polar surface, and wherein the mobile phase contains an organic solvent.

5. The method of Claim 4, wherein the separation medium has a nonpolar separation surface that is substantially free of multivalent cations that are capable of interfering with polynucleotide separations.

6. The method of Claim 5, wherein the solutions used are substantially free of multivalent cations capable of interfering with polynucleotide separations.

7. The method of Claim 1, wherein the chemical tag has an affinity towards the separation medium.

8. The method of Claim 7, wherein the chemical tag is hydrophobic.

9. The method of Claim 7, wherein the chemical tag is biotin.

10. The method of Claim 7, wherein the chemical tag is charged.

11. The method of Claim 7, wherein the tag comprises a fluorescent group.

12. The method of Claim 4, wherein the separation medium comprises polymer beads having an average diameter of 0.5 to 100 microns, the beads being unsubstituted polymer beads or polymer beads substituted with a moiety selected from the group consisting of hydrocarbon having from one to 1,000,000 carbons.

13. The method of Claim 4, wherein the separation medium comprises particles selected from the group consisting of silica, silica carbide, silica nitrite, titanium oxide, aluminum oxide, zirconium oxide, carbon, insoluble polysaccharide, and diatomaceous earth, the particles having separation surfaces which are coated with a hydrocarbon or non-polar hydrocarbon substituted polymer, or have

substantially all polar groups reacted with a non-polar hydrocarbon or substituted hydrocarbon group, wherein the surfaces are non-polar.

14. The method of Claim 4, wherein the medium comprises a polymeric monolith.

15. The method of Claim 4, wherein the medium comprises a derivatized silica gel monolith.

16. The method of Claim 8, wherein the tag comprises a hydrocarbon group, wherein the hydrocarbon group is selected from the group consisting of alkyl, cycloalkyl, aryl and arylalkyl groups.

17. The method of Claim 4, wherein the separation medium has been subjected to acid wash treatment to remove any residual surface metal contaminants.

18. The method of Claim 4, wherein the separation medium has been subjected to treatment with a multivalent cation binding agent.

19. The method of Claim 4, wherein the organic solvent is selected from the group consisting of alcohol, nitrile, dimethylformamide, tetrahydrofuran, ester, ether, and mixtures of one or more thereof.

20. The method of Claim 19, wherein the organic solvent comprises acetonitrile.

21. The method of Claim 4, wherein the mobile phase contains a second counterion agent, which may or may not be the same as the first counterion agent.

22. The method of Claim 21, wherein the first and second counterion agents are selected from the group consisting of lower alkyl primary amine, lower alkyl secondary amine, lower alkyl tertiary amine, lower trialkylammonium salt, quaternary ammonium salt, and mixtures of one or more thereof.

23. The method of Claim 22, wherein the first and second counterion agents are selected from the group consisting of octylammonium acetate, octadimethylammonium acetate, decylammonium acetate, octadecylammonium

acetate, pyridiniumammonium acetate, cyclohexylammonium acetate, diethylammonium acetate, propylethylammonium acetate, propyldiethylammonium acetate, butylethylammonium acetate, methylhexylammonium acetate, tetramethylammonium acetate, tetraethylammonium acetate, tetrapropylammonium acetate, tetrabutylammonium acetate, dimethydiethylammonium acetate, triethylammonium acetate, tripropylammonium acetate, tributylammonium acetate, tetrapropylammonium acetate, tetrabutylammonium acetate, triethylammonium hexafluoroisopropyl alcohol, and mixtures of one or more thereof.

24. The method of Claim 23, wherein the counterion agent is tetrabutylammonium acetate.

25. The method of Claim 23, wherein the counterion agent is triethylammonium acetate.

26. The method of Claim 4, wherein amplification is achieved by PCR.

27. The method of Claim 4, wherein the amplification products are DNA molecules.